IPRO 310

Designing and Building Prototypes for Assisting Blind Swimmers

Spring 2008

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Problem

Our Mission

"Provide a safe, effective, and reliable assistive device for visually impaired swimmers"

IPRO 310

Code of Ethics: Over-arching principle

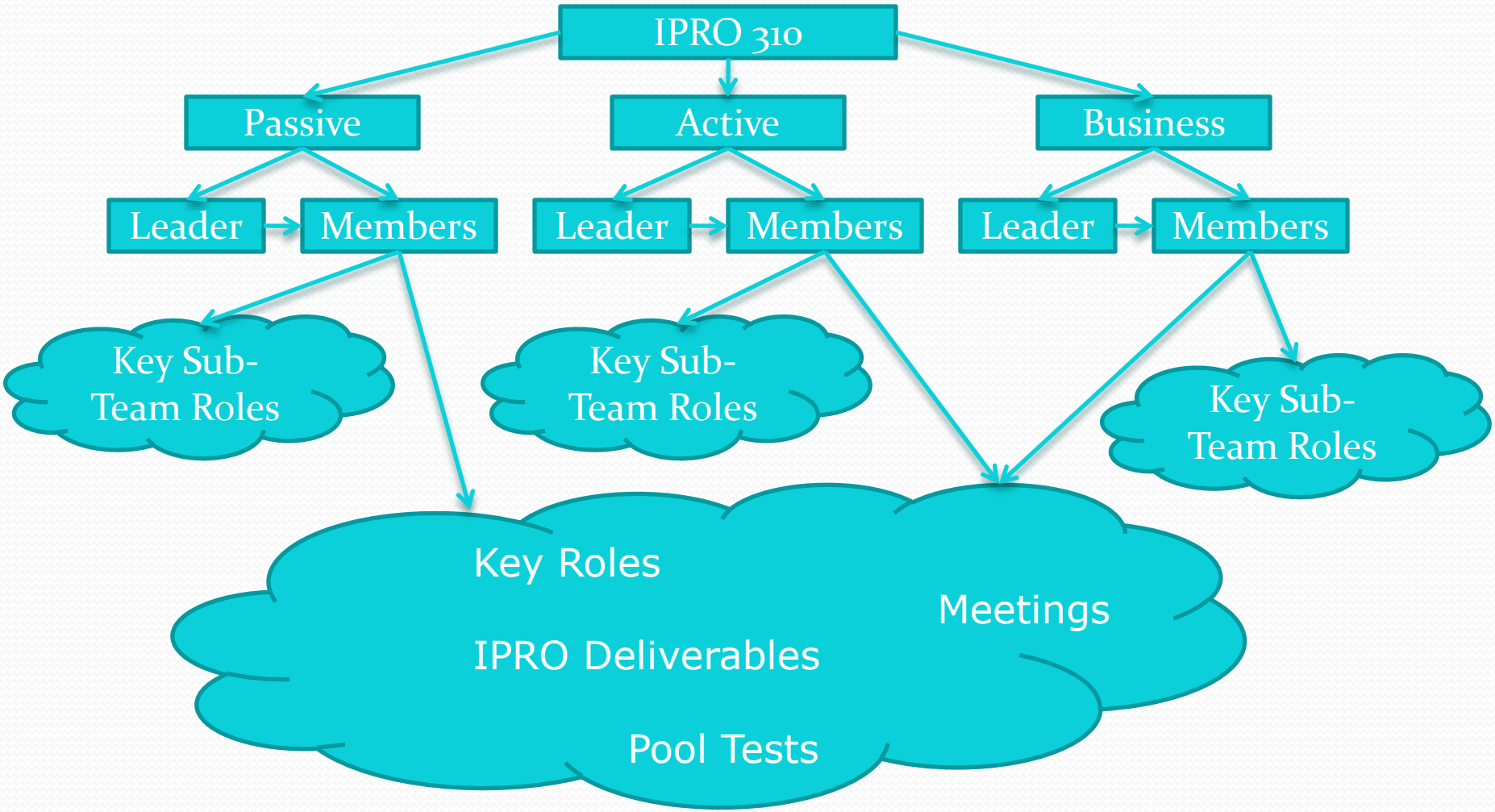
Current Methods

- Using lane dividers
- Hiring guides

Previous Research

- Key findings
  - Prefer tactile to audio feedback
  - Item must be lightweight and not bulky
- Solutions identified
  - Passive device
  - Active device

Team Organization



Passive Team

Objectives:

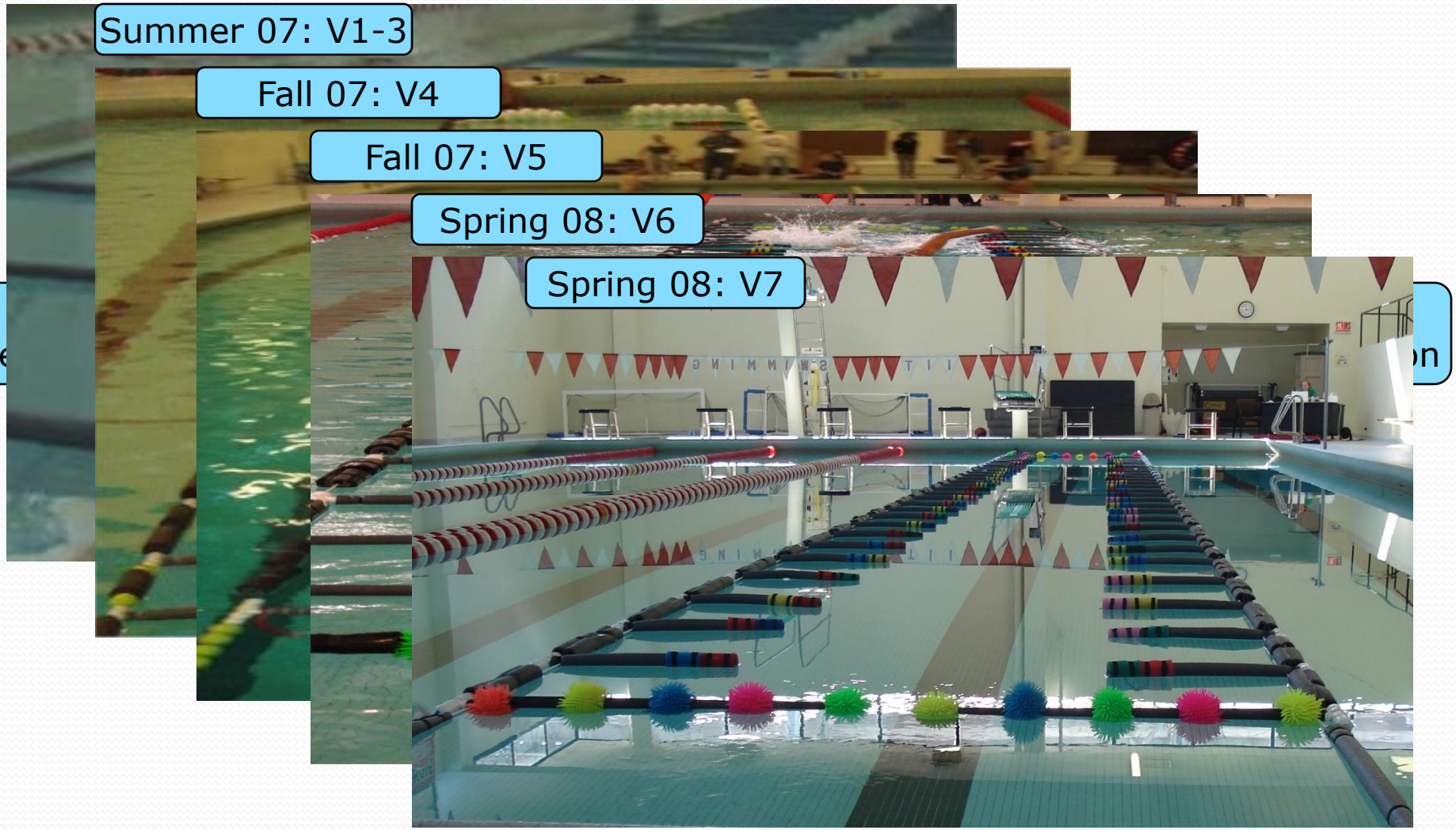
- Improve aspects of previous versions
- Create working device for durability test
- Develop a storage system

Goals:

- Solve problems with initial design
- Implement recommendations from swimmers in updated design

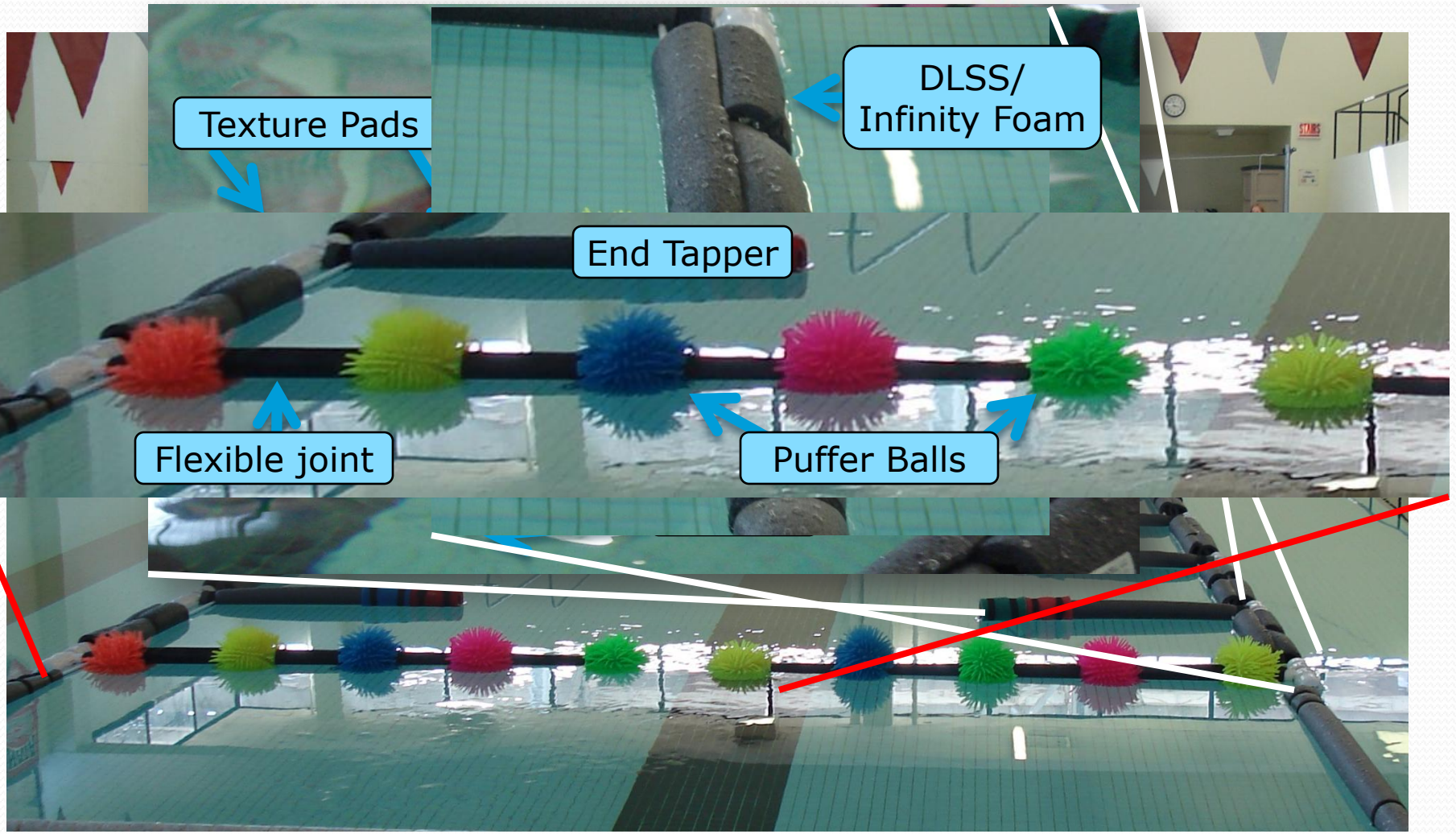
Design Cycles and Progress

Problem Identification → Brainstorm → Design → Prototype → Manufacture → Test → Problem Identification



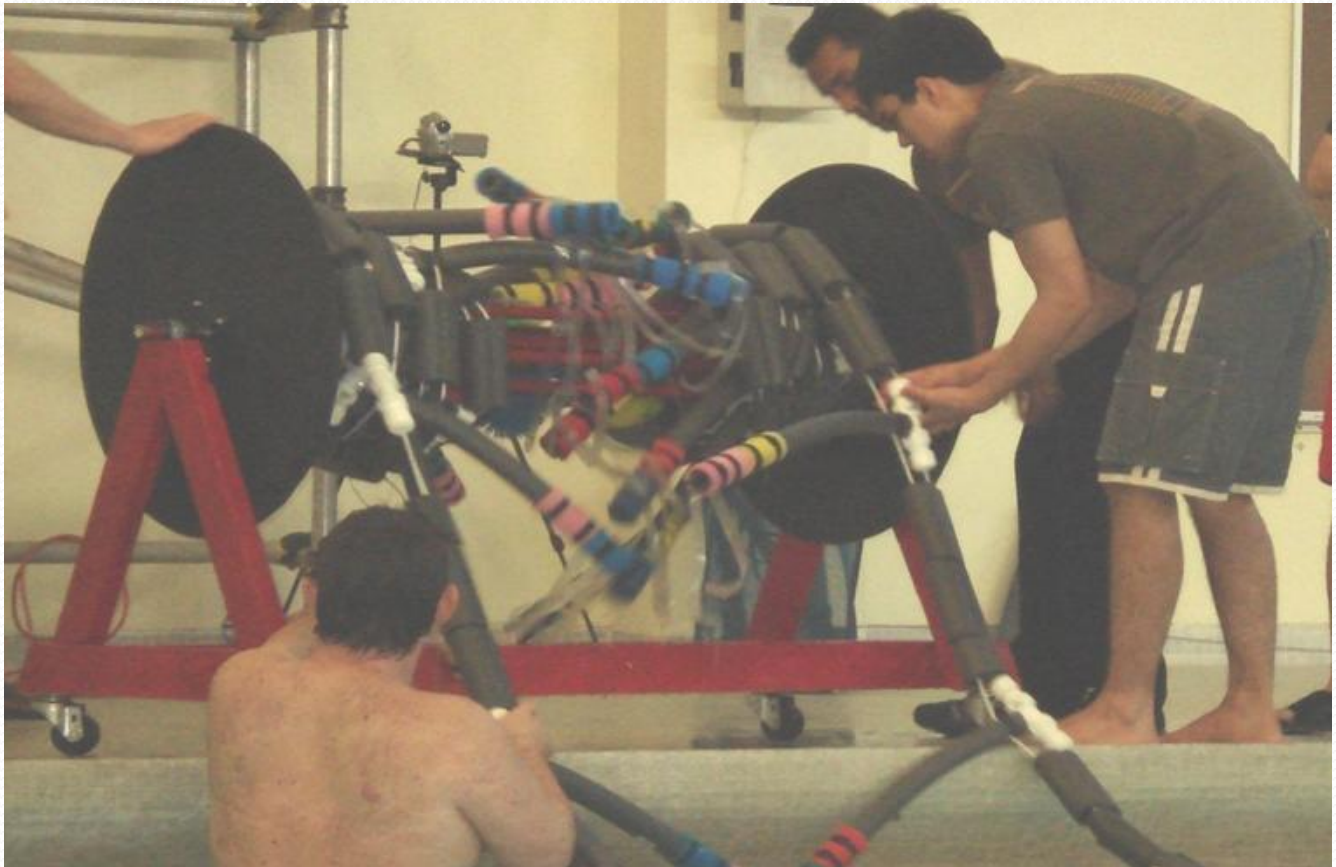
Timothy J. Paul – VII

Key Solution Components



Results and Next Steps

- Passive device is ready for durability test this summer
- Storage system has been implemented
- Prepare provisional patent



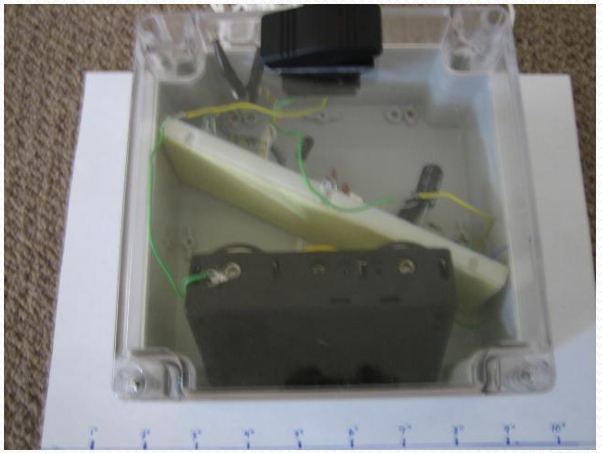
Active Team

- Objectives: Design and build functioning electronic device

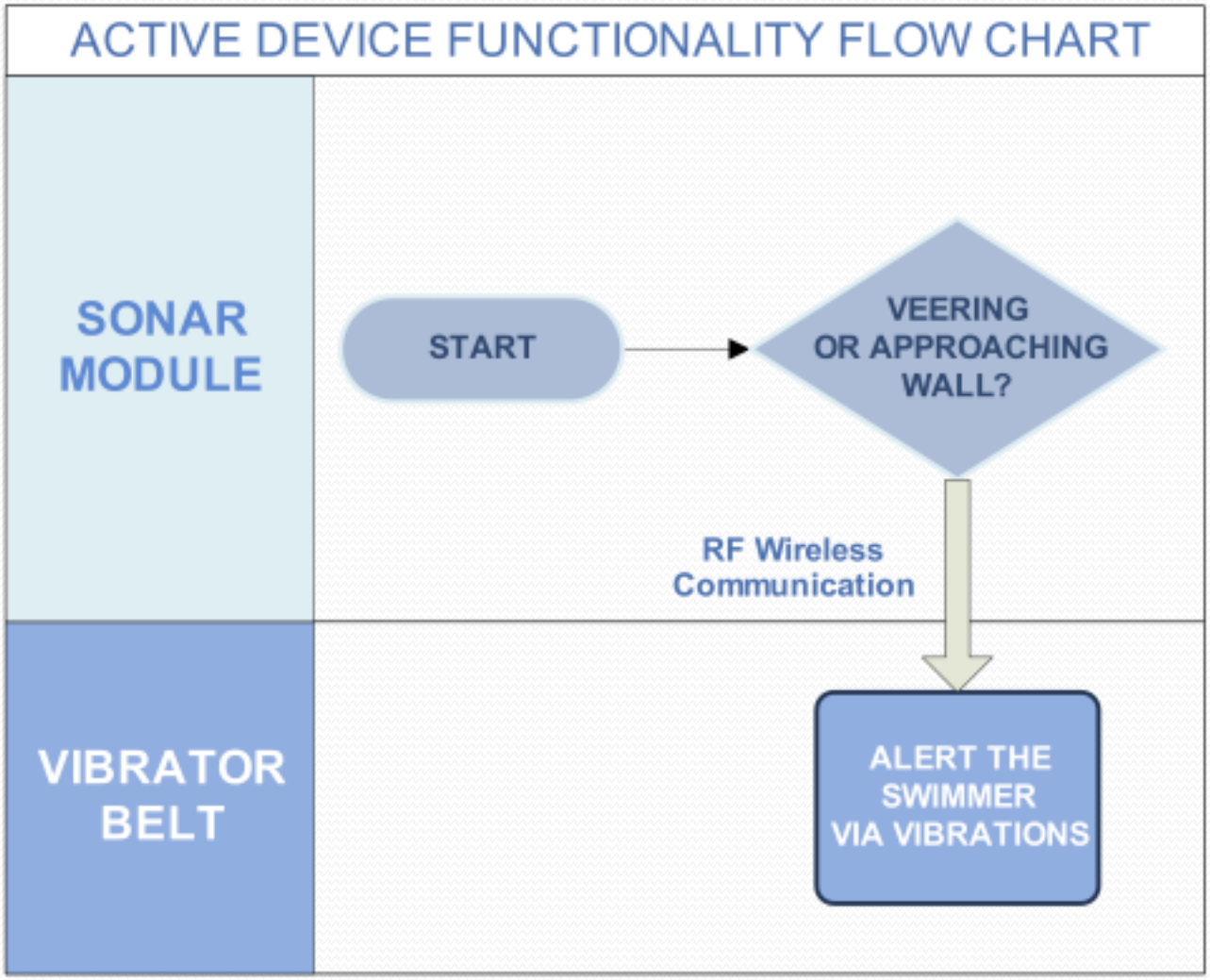
- Goals:
  - Re-design the existing device
  - Develop a vibration language
  - Design and implement user functions
  - Incorporate sonar technology

Active Device

- Belt worn by the swimmer
- Stationary sonar controller
- Provides tactile feedback in the form of vibrations



Active Device

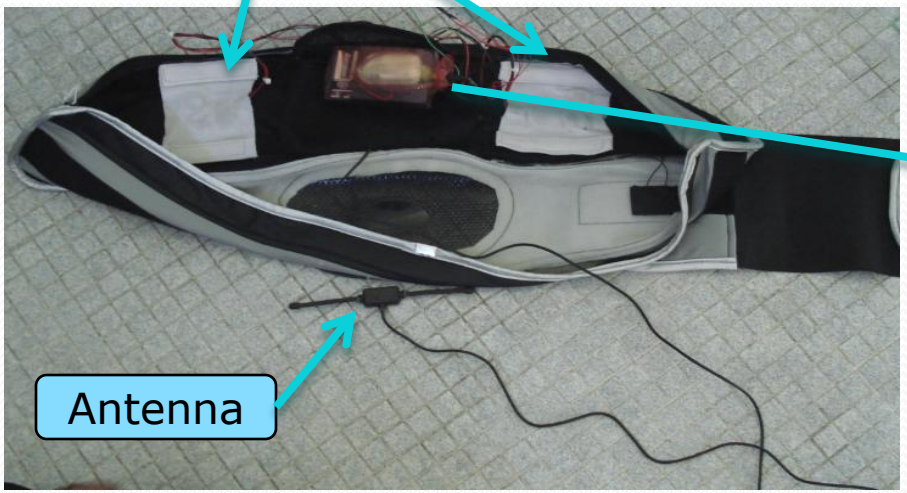


Key Components

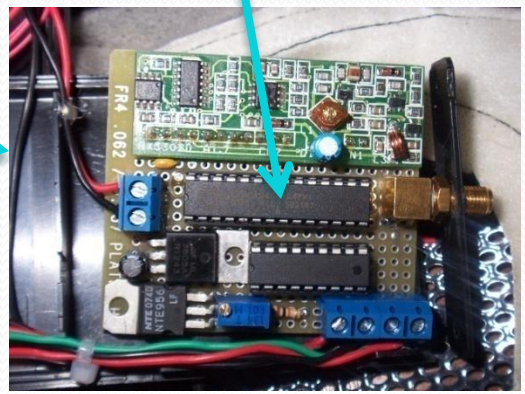
- Belt
- Vibrator motors
- PSoC micro-controllers
- RF transmitter/receiver

RF Transmitter

Motors



PSoC



Results

- Successful vibratory language
- Signal interference discovered
- Sonar module not tested on April 20th

Next Steps

- Develop functioning sonar module
- Overcome signal interference
- Prepare provisional patent

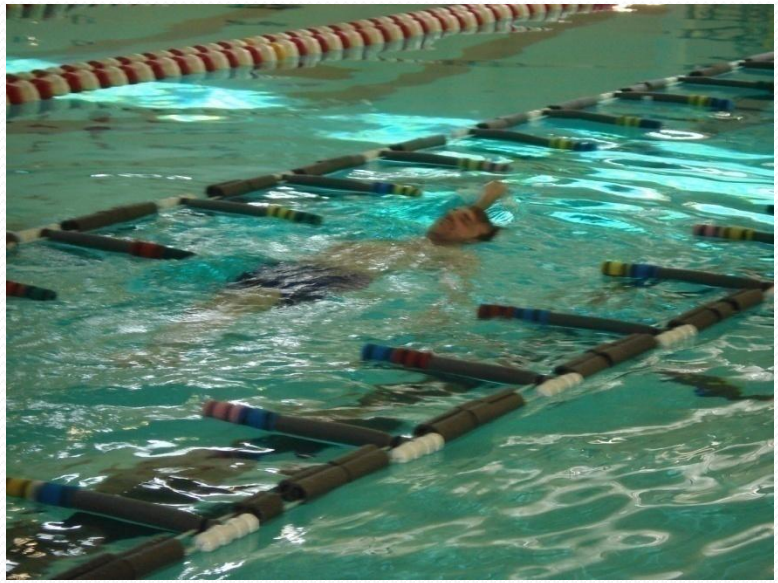
Pool Tests

Visually impaired swimmers

- Variety of physiques
- Variety of swimming styles

Main competitive and recreational strokes

- Freestyle
- Backstroke
- Breaststroke
- Butterfly
- Sidestroke



Pool Test Preparation

- Scheduling
  - March 9th
  - April 20th
- IRB Certification
- Obtaining Informed Consent
- Role Designations
- Practice
- Swimmers

Data

- Feedback from swimmers
- Team observations
- Conclusions:
  - Design modification
  - Engineering notebook

Time Spent

	1st Device	1st Test	2nd Device	2nd Test	Total
Passive	209	31	150	25	415
Active	201	23	117	21	362
Business	169	16	100	15	300
Total	579	70	367	61	1077

Team Budget

	Spent	Budget
Passive Team	$430	$1000
Active Team	$699	$585
Pool Test	$320	$350
Misc	$80	$500
Total	$1529	$2435

Intellectual Property of eyeSwim Devices

- IP would be held by IIT
- Criteria for filing provisional patent
  - Novelty
  - Inventive Step
  - Industrial Applicability

Claims

eyeSwim

- Texture pads
- “Icicles”
- T-Connector
- End-of-lane tapper
- Infinity foam
- Dual Line Stabilization System

eyeSwim Sonar

- Unique combination of PSoC and other devices to provide tactile feedback to blind swimmers about their location.

Summary

QUESTIONS?

Special thanks to:

Chicago Lighthouse for the Blind
Notre Dame Masters Swim Program
Electrical Engineering Department of Rose Hulman University
Cypress Semiconductors Inc
Mid-Town Tennis Club

Blind swimmers:
Ann Brasch
James Fetter
Kelsey Thompson
Mazen Istanbouli
Tim Spencer
Timothy J Paul